

Nov. 28, 1950

A. R. ATCHISON
TELEVISION AERIAL

2,532,138

Filed June 18, 1949

2 Sheets-Sheet 1

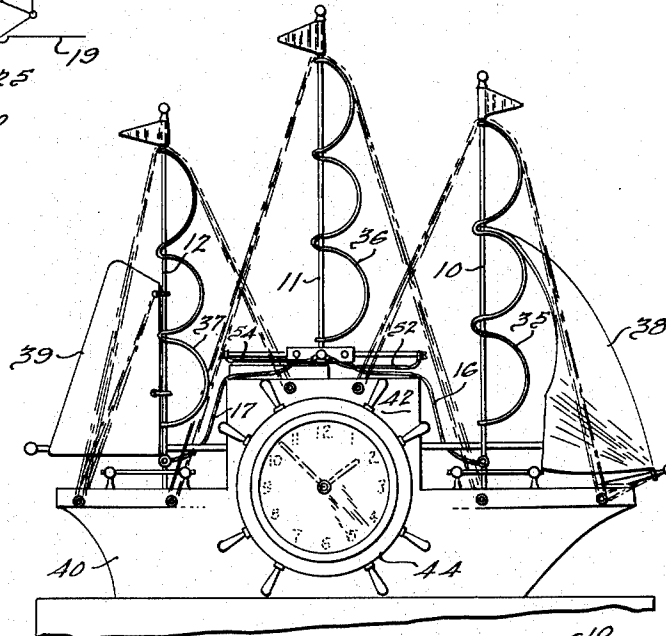
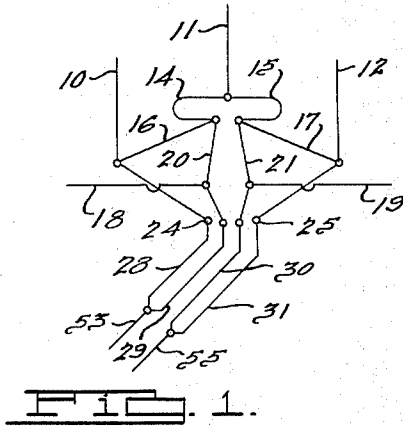


FIG. 2.

FIG. 3.

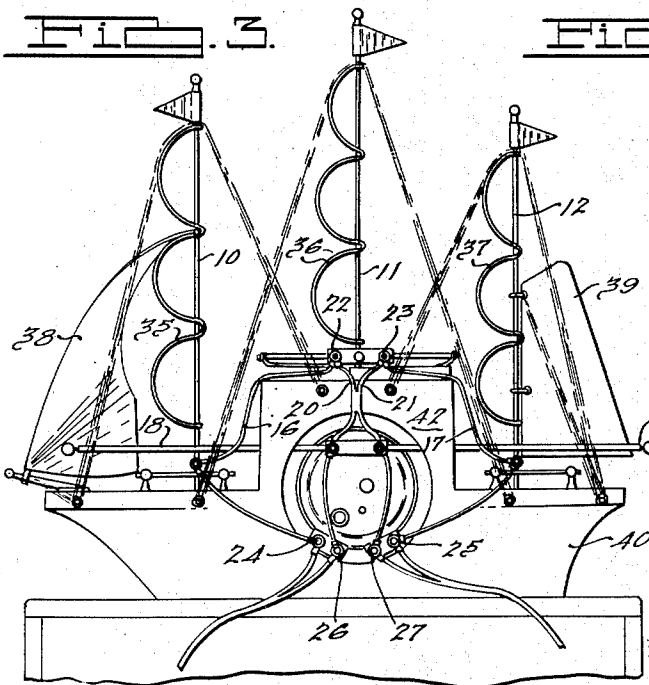
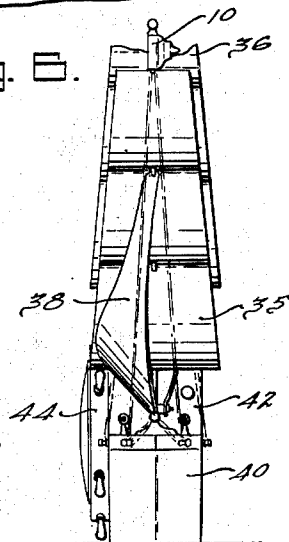


FIG. 4.



INVENTOR.

Arreather R. Atchison.

BY

Harold L. Dickey & Pierce.

ATTORNEYS.

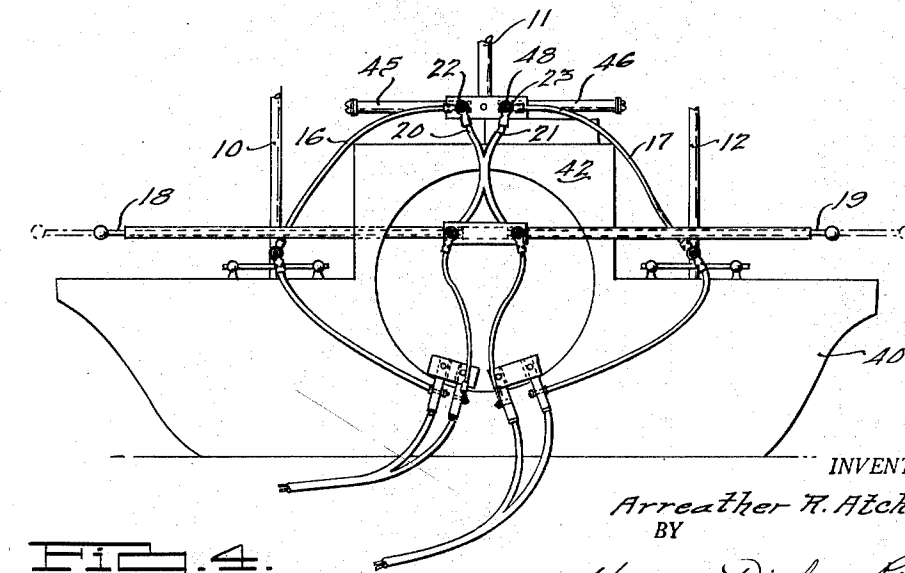
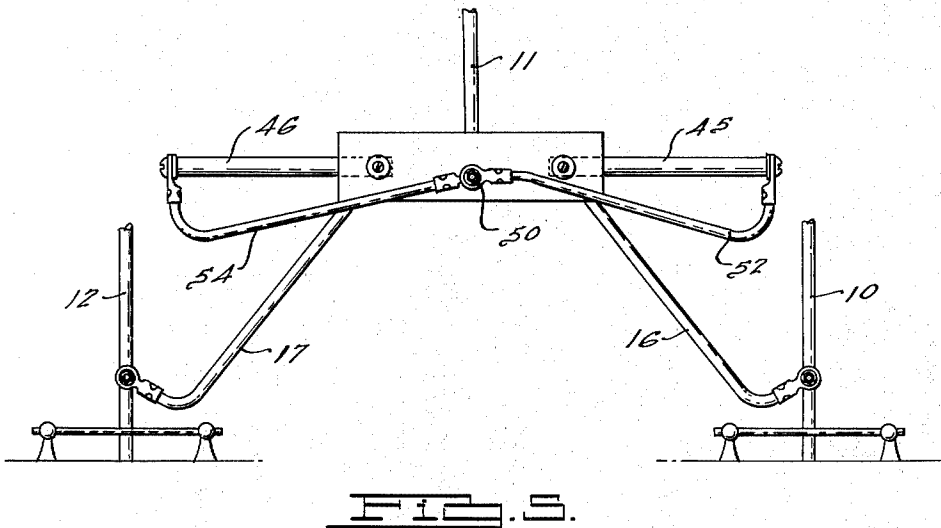
Nov. 28, 1950

A. R. ATCHISON
TELEVISION AERIAL

2,532,138

Filed June 18, 1949

2 Sheets-Sheet 2



INVENTOR.
Arreather R. Atchison.
BY
Harness, Dickey & Purse
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,532,138

TELEVISION AERIAL

Arreather Ray Atchison, Detroit, Mich.

Application June 18, 1949, Serial No. 99,939

6 Claims. (Cl. 250—33.53)

1

The present invention relates to radio antennae, and particularly to receiving antennae for the reception of relatively wide bands at very high frequencies and above, such as are employed in television, frequency modulated broadcast transmission and the like.

An important object of the invention is to provide an improved antenna of the indicated character having a wide frequency response and which is capable of providing a strong signal of high quality on all of the operating channels now in commercial use for television broadcasting, which will provide a signal which possesses full, sharp detail and which is free from ghosts and other imperfections.

A further object is to provide such an antenna which is virtually nondirectional in its response.

Another object is to provide such an antenna system which is of compact construction and which is adapted to be embodied in a structure of attractive appearance, which is suitable for use as an ornament, and adapted to be placed directly in the room, upon or near the television receiver to which it is connected.

Other objects and advantages of the invention will become apparent upon consideration of the present disclosure in its entirety.

In the drawing:

Figure 1 is an equivalent schematic circuit diagram of an antenna system incorporating the principles of my invention;

Figs. 2 and 3 are front and rear elevational views, respectively, of a useful and ornamental device, comprising an ornamental clockcase, having antenna components of ornamental character and embodying my invention;

Fig. 4 is a partly diagrammatic rear elevational view upon a somewhat larger scale and with certain of the ornamental components removed, showing the method of wiring;

Fig. 5 is a similar simplified elevational view from the front; and

Fig. 6 is an end elevational view taken substantially as indicated by the line and arrows 6—6 of Fig. 2, but partly broken away.

Referring now to the drawings, the general arrangement of the principal components of my preferred array is shown in Fig. 1 as comprising three vertical rods 10, 11 and 12, a folded dipole, the legs of which are designated 14 and 15, a substantially rhombic antenna formed in two halves, respectively designated 16 and 17, and a straight dipole comprised of arms 18 and 19. Connections to the two halves of the rhombic antenna are made at the top center by lead wires 20 and 21. Wires 20 and 21 are also connected to the folded dipole 14, 15 and to the dipole sections 18, 19.

The top center of the rhombic antenna is divided, and connected to the ends of the folded dipole at the terminals 22, 23 to which the wires 20, 21 are also connected. The rod 11 is con-

2

nected to the center of the dipole and through the folded dipole to the top center connections 22, 23 of the rhombic structure, the folded dipole serving as connecting means between vertical rod 11 and the rhombic sections.

The rods 10 and 12 are connected to the outer ends of the legs of the rhombic structure, and the rhombic antenna is also divided at the center bottom, and separate transmission line connections are made to each leg of the rhombic antenna, at terminals 24, 25. Terminals 26, 27 are also provided for lead-in connections to the wires 20, 21.

The transmission lines are designated 28, 29, 30 and 31, and all of these have an iterative impedance, which may be of the order of 300 ohms.

The components of this array need not be, and preferably are not, resonant within the frequency bands to be received. For example in the preferred construction illustrated in Figs. 2 to 5, each arm of the folded horizontal dipole is approximately $3\frac{1}{2}$ " long and it is geometrically resonant at approximately 1000 megacycles. Each arm of the straight dipole 18, 19 is 8" long, so that it is resonant at approximately 250 megacycles. Each branch of the rhombic antenna is approximately 6" long, and it is also resonant well above the highest channel for which the system is designed. The vertical members 10, 11 and 12 are 12" long and resonant at approximately 100 megacycles. The wires 20, 21 are $9\frac{1}{2}$ " long in their full length from terminals 26, 27 to terminals 22, 23, the part from terminals 26, 27 to the straight dipole being $6\frac{1}{2}$ " long. All of the antenna elements are therefore resonant at frequencies much higher than the frequencies of the television channels of Groups A and B, which the array is designed to receive.

Although the transmission lines are proportioned to have fundamental or harmonic resonances in or close to the frequencies to be received, in the preferred construction illustrated, they are apparently non-resonant in effect, due to their iterative impedance. The transmission lines employed with the preferred array disclosed are 12' long, and are quarter wave resonant just above the channels of Group A. and one-eighth wave resonant just below the channels of Group B.

The elements of the array are loaded with substantial distributed capacitance. The capacitance comprises metal plates 35, 36, 37, 38, 39. These are carried by and connected to the vertical rods 10, 11, 12. Plates 35, 36 and 37 are of generally wavular or half-looped form and connected to the rods at a plurality of points. All of the principle antenna components previously described lie substantially in a common plane. The plates 35, 36 and 37 are perpendicular to such plane and extend substantially the full height of the rods, while plates 38, 39 lie approximately in the plane of the system.

3

In the construction illustrated by way of example, all of the antenna elements are carried by a suitable insulating support 40, which may be formed of wood, and which, to typify the adaptability of the array to ornamental installations, is illustrated as contoured to represent the hull of a ship. The vertical rods 10, 11 and 12 are positioned to represent the masts of the vessel. The hull may also serve as a clockcase, if desired, as shown, a portion of the hull being projected upwardly as indicated at 42 to represent a cabin and to accommodate the clock 44. Such upwardly projecting portion 42 supports the central rod 11 in a somewhat elevated position and also carries on its top the folded dipole 14, 15, while the dipole rods 13, 19 are projected through and carried by a lower portion of the "cabin" section 42, as best shown in Fig. 3. The dipole rods may be of telescopically extensible form, if desired. The folded dipole is supported by the central rod 11, such folded dipole being comprised of rod sections 45, 46 carried by and projecting horizontally from an insulating block 48 carried by the mast 11. The wires 20, 21 are connected to terminals 22, 23 connected to the inner ends of the rods and carried by the block 48, while the return legs of the dipole comprise wires 52, 54 connected to the outer ends of the rods 45, 46 and extending inwardly to connect with a terminal 53 which is electrically connected to the mast 11.

At their set ends, the transmission lines 28 and 29 are connected together to form a single lead-in connection 53, and the lines 30 and 31 are connected together to form a single lead-in connection 55. The short-circuiting of the lead-in lines at the receiver terminals in this manner has no appreciable effect within the television bands in view of the characteristics of the transmission lines. The capacitive loading substantially widens the frequency acceptance band and makes the array less critical to changes in resonances. The array is also virtually nondirectional.

In operation an array of this character shows excellent response in all of the channels presently in use, and in a field of reasonable intensity produces excellent signals, free from ghosts and possessing high detail.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. An antenna array consisting of a substantially rhombic antenna divided into two sections, a dipole antenna having one dipole connected to each section of the rhombic antenna, the dipole being folded and serving as a connection between said rhombic sections, and a vertical antenna member connected substantially to the mid-point of the folded dipole.

2. An antenna array consisting of a substantially rhombic antenna divided into two sections, a dipole antenna having one dipole connected to each section of the rhombic antenna, the dipole being folded and serving as a connection between said rhombic sections, a vertical antenna member connected substantially to the mid-point of the folded dipole, and a plurality of additional vertical antenna members connected at substantially uniformly spaced positions to the rhombic sections.

4

3. An antenna array consisting of a substantially rhombic antenna divided into two sections, a dipole antenna having one dipole connected to each section of the rhombic antenna, the dipole being folded and serving as a connection between said rhombic sections, a vertical antenna member connected substantially to the mid-point of the folded dipole, and a pair of additional vertical antenna members, one member of each such pair being connected to each rhombic section near the outer end thereof.

4. An antenna array consisting of a rhombic antenna divided into two sections, a dipole antenna having one pole connected to each section of the rhombic antenna, the dipole being folded and serving as a connection between said rhombic sections, said array being designed for wide-band reception of television signals and the like and each aerial of the array being resonant at a frequency substantially above the frequencies to be received, and a vertical antenna member connected substantially to the mid-point of the folded dipole.

5. An antenna array consisting of a rhombic antenna divided into two sections, a dipole antenna having one pole connected to each section of the rhombic antenna, the dipole being folded and serving as a connection between said rhombic sections, said array being designed for wide-band reception of television signals and the like and each aerial of the array being resonant at a frequency substantially above the frequencies to be received, a vertical antenna member connected substantially to the mid-point of the folded dipole, and a plurality of additional vertical antenna members connected at substantially uniformly spaced positions to the rhombic sections.

6. An antenna array consisting of a rhombic antenna divided into two sections, a dipole antenna having one pole connected to each section of the rhombic antenna, the dipole being folded and serving as a connection between said rhombic sections, said array being designed for wide-band reception of television signals and the like and each aerial of the array being resonant at a frequency substantially above the frequencies to be received, a vertical antenna member connected substantially to the mid-point of the folded dipole, and a pair of additional vertical antenna members, one member of each such pair being connected to each rhombic section near the outer end thereof.

ARREATHER RAY ATCHISON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

60 Number	Name	Date
1,610,704	Paddack	Dec. 14, 1926
1,924,408	Leib	Aug. 29, 1933
2,297,925	Usselman	Oct. 6, 1942
2,324,462	Leeds et al.	July 13, 1943
2,419,539	Clark et al.	Apr. 29, 1947
2,423,083	Daubaras	July 1, 1947
2,426,632	Marchand	Sept. 2, 1947
2,448,017	Busignies	Aug. 31, 1948
2,495,579	Ferris et al.	Jan. 24, 1950

OTHER REFERENCES

Radio News, October 1948, page 99.
Proc. IRE, October 1948, page 1246.
Journal of the Institution of Electrical Engineers, vol. 94, part III, 1946, pages 106 and 107.